Appendix E
Crosswalk to EPA's 7-Step DQO Process

E.1 Comparison of TPP Process to EPA s 7-Step DQO Process

U.S. Environmental Protection Agency's (EPA's) 7-Step Data Quality Objective (DQO) Process[1] and the Technical Project Planning (TPP) process are both planning tools intended to ensure data are of the type, quantity, and quality needed for decision making at hazardous, toxic, and radioactive waste sites. Figure E-1 represents similarities between EPA's 7-Step DQO Process and the TPP process. As compared to the 7-Step DQO Process, the TPP activities, guidance, and tools provide more explicit guidance and support for designing a data collection program for a site.

In general, the 7-Step DQO Process is a decision quality objective process that enables a team to quantify tolerable decision error within a sample design. The 7-Step DQO Process supports a team's efforts to develop the basis for probabilistic decisions at a site. Outputs throughout the 7-Step DQO process are the decision performance criteria that will be used to develop a data collection program.

The TPP process is a comprehensive and systematic project planning process to design a data collection program. Preparation of probabilistic and nonprobabilistic DQO statements is the culmination of many of the TPP activities. DQO statements are just one of the outcomes of the TPP efforts.

E.2 Crosswalk Between EPA's 7-Step DQO Process and the TPP Process

Table E-1 offers a detailed crosswalk from each portion of EPA's 7-Step DQO Process to the corresponding activity within the TPP process.

E.3 Use of EPA's 7-Step Process During TPP Activities

When using the TPP process, technical personnel can refer to Table E-1 to determine which portion(s) of EPA's 7-Step DQO Process guidance corresponds to a specific TPP activity. In those instances when a data user defines a probabilistic-type data need during Phase II (see Paragraph 2.1.4.1), the data user should use Steps 5 and 6 of the 7-Step DQO Process to determine the number of samples required for the intended data use. During Phase III, data implementors will find Step 7 of EPA's 7-Step DQO Process useful when optimizing sampling plans for the data needed for probabilistic decisions. After using Steps 5 through 7 of EPA's 7-Step Process, use of the TPP process should be completed to ensure appropriate sampling and analysis methods are identified to obtain the data needed, data collection options are considered, and detailed DQO statements are produced.

E.4 Definitions of DQOs

As defined by EPA, DQOs are *qualitative and quantitative statements derived from the DQO Process that clarify study objectives, define the appropriate type of data, and specify the tolerable levels of potential decision errors that will be used as the basis for establishing the quality and quantity of data needed to support decisions.* [1] As discussed in Paragraph 4.2.1, DQOs produced as a result of the TPP process meet EPA's definition of a DQO. The DQOs documented during Phase IV of the TPP process should be project-specific statements that describe the intended data use(s), the data need requirements, and the means to achieve acceptable data quality for the intended use(s). DQOs documented as a result of the TPP process should be comprehensive and include each of the nine data quality requirements listed in Paragraph 4.2.1.1.

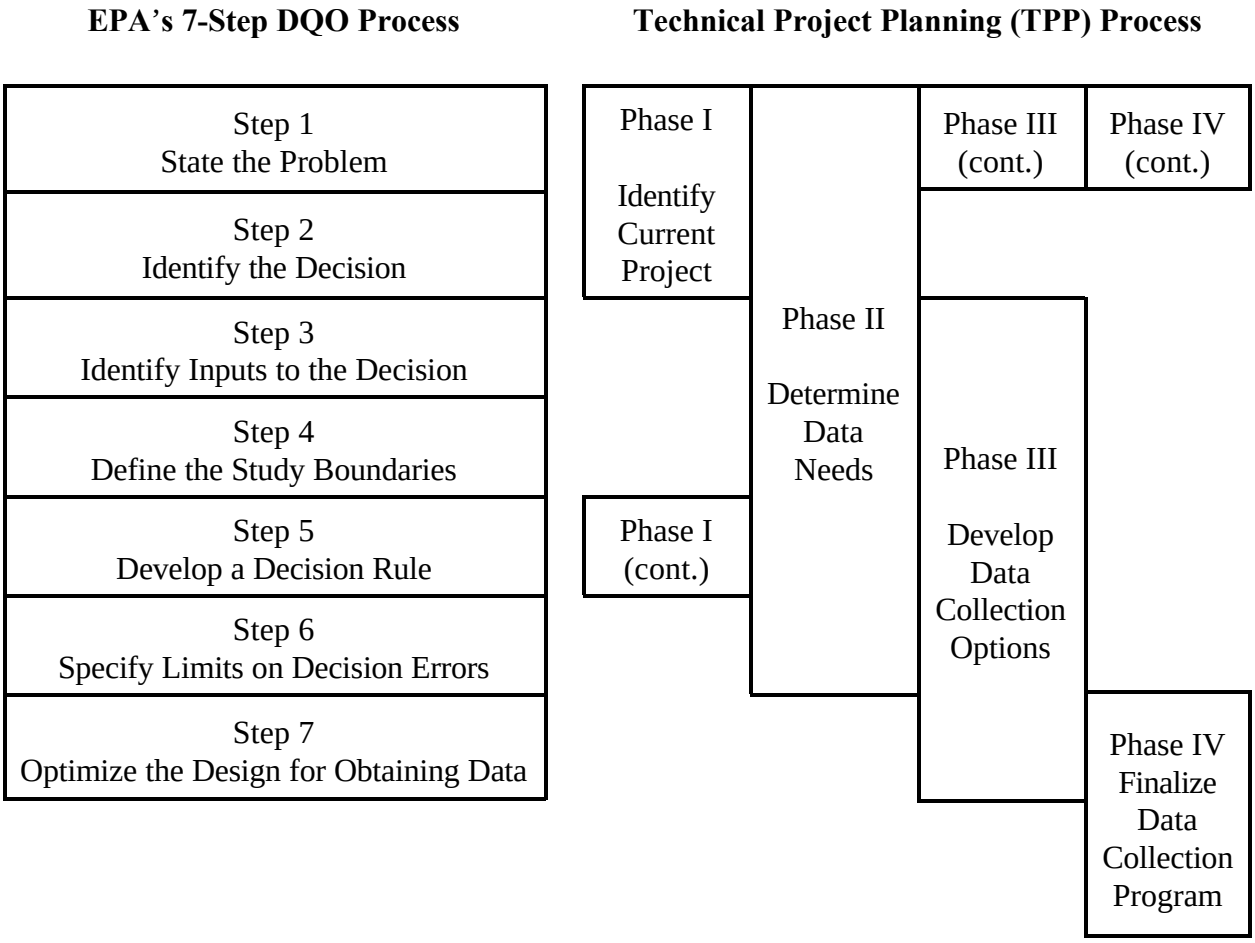

Figure E-1
Alignment Between EPA s 7-Step DQO Process and the TPP Process

Table E-1
Crosswalk from 7-Step DQO Process to the TPP Process

EPA's 7-Step DQO Process[a]		Technical Project Planning (TPP) Process[b]	
DQO Step	Activity[c]	Activity	TPP Phase(s)
Step 1 State the Problem	1.1 "Identify members of the planning team." (p 10) - "Samplers - Chemists and Other Scientists and Engineers - Modelers - Technical Project Managers - Community Representatives - Administrative and Executive Managers - QA/QC Experts (e.g., QA Manager) - Data Users - Decision Makers - Statistician (or someone knowledgeable and experienced with environmental statistical design and analysis)"	Identify TPP Team Members (Paragraph 1.1.1, p 1-2 to 1-5) - Decision Makers Customer Project Manager (PM) Regulators Stakeholders - Data Users Risk Perspective Compliance Perspective Remedy Perspective Responsibility Perspective - Data Implementors Sampling Perspective Analysis Perspective	Phase I
	1.2a "Identify the primary decision maker of the planning team ..." (p 10)	[Under the leadership of the PM, the TPP process involves bringing together all of the decision makers to ensure that the data collection program consists of all the required data, within project constraints, and that the data is available for timely decisions.]	Phase I
	1.2b "... and define each member's role and responsibility during the DQO process." (p 10)	[EM 200-1-2 describes the responsibilities of each team member for every TPP activity.]	All Phases

EPA's 7-Step DQO Process[a]		**Technical Project Planning (TPP) Process**[b]	
DQO Step	Activity[c]	Activity	TPP Phase(s)
Step 1 State the Problem (continued)	1.3 "Develop a concise description of the problem." (p 11)	Identify Customer Goals (Paragraph 1.1.2, p 1-5 to 1-6) Identify and Document Project Objectives (Paragraph 1.2.2, p 1-10 to 1-12) Identify Regulator and Stakeholder Perspectives (Paragraph 1.2.3, p 1-12)	Phase I
	1.3.1 "Describe the conditions or circumstances that are causing the problem and the reason for conducting (sic) the study." (p 11 and Table 1-1, p 12)	Customer's Concept of Site Closeout (Paragraph 1.1.2.1, p 1-5 to 1-6) Evaluate Site Information and Data (Paragraph 1.2.1, p 1-8 to 1-10) Identify and Document Project Objectives (Paragraph 1.2.2, p 1-10 to 1-12) Identify Regulator and Stakeholder Perspectives (Paragraph 1.2.3, p 1-12)	Phase I
	1.3.2 "Describe the problem as it is currently understood by briefly summarizing existing information." (p 11)	Gather Existing Site Information (Paragraph 1.1.3, p 1-6 to 1-7) Evaluate Site Information and Data (Paragraph 1.2.1, p 1-8 to 1-10)	Phase I
	1.3.3 "Conduct literature searches and examine past or ongoing studies to ensure that the problem is correctly defined and has not been previously solved." (p 11)	Gather Existing Site Information (Paragraph 1.1.3, p 1-6 to 1-7) Evaluate Site Information and Data (Paragraph 1.2.1, p 1-8 to 1-10) "If enough data of an acceptable quality already exist to satisfy all project objectives to site closeout, then the PM and technical personnel should assist the customer in petitioning the regulators for site closeout and delisting, as appropriate." (p 1-13) Identify Executable Stages to Site Closeout (Paragraph 1.2.5, p 1-13 to 1-14) Evaluate Use of Existing Data (Paragraph 2.1.3, p 2-4)	Phase I Phase II

Table E-1 (continued)
Crosswalk from 7-Step DQO Process to the TPP Process

EPA's 7-Step DQO Process[a]		Technical Project Planning (TPP) Process[b]	
DQO Step	Activity[c]	Activity	TPP Phase(s)
Step 1 State the Problem (continued)	1.3.4a "If the problem is complex, consider breaking it into more manageable pieces. Identify those pieces that could be addressed by separate studies." (p 11)	Define Courses of Action for Achieving Site Closeout (Paragraph 1.3.2, p 1-16 to 1-17) - operable units/exposure areas - expedited removal - phasing (series or parallel) - field screening and field analytical methods - expedited site characterization Establish Data User's Roles (Paragraph 2.1.2, p 2-1 to 2-4)	Phase I Phase II
	1.3.4b "Assign priorities to and logical relationships among the pieces of the problem." (p 11)	Define Courses of Action for Achieving Site Closeout (Paragraph 1.3.2, p 1-16 to 1-17) Document Current Executable Stage (Paragraph 1.3.3, p 1-18)	Phase I
	1.4 "Specify the available resources and relevant deadlines for the study." (p 11)	Identify TPP Team Members (Paragraph 1.1.1, p 1-2 to 1-5) Document Current Executable Stage (Paragraph 1.3.3, p 1-18) Finalize Acquisition Strategy (Paragraph 1.4.1, p 1-18) Prepare Phase I Memorandum for Record (Paragraph 1.4.3, p 1-19)	Phase I
	1.4a "Stipulate the anticipated budget ..." (p 11)	Customer's Site Budget (Paragraph 1.1.2.3, p 1-6) Prepare Phase I Memorandum for Record (Paragraph 1.4.3, p 1-19) Prepare Detailed Cost Estimate (Paragraph 4.2.3, p 4-5)	Phase I Phase IV

Table E-1 (continued)
Crosswalk from 7-Step DQO Process to the TPP Process

EPA's 7-Step DQO Process[a]		Technical Project Planning (TPP) Process[b]	
DQO Step	Activity[c]	Activity	TPP Phase(s)
Step 1 State the Problem (continued)	1.4b "... available personnel and contractual vehicles." (p 11)	Identify TPP Team Members (Paragraph 1.1.1, p 1-2 to 1-5) Prepare Phase I Memorandum for Record (Paragraph 1.4.3, p 1-19) Initiate Scope of Work Sections (Paragraph 1.4.2, p 1-1-19) Prepare Final Scope of Work or Work Plan (Paragraph 4.2.2, p 4-5)	Phase I Phase IV
	1.4c "Also, enumerate any deadlines for completion of the study and any intermediate deadlines that may need to be met." (p 11)	Customer's Schedule Requirements (Paragraph 1.1.2.2, p 1-6) Identify Executable Stages to Site Closeout (Paragraph 1.2.5, p 1-13) Document Current Executable Stage (Paragraph 1.3.3, p 1-18) Prepare Phase I Memorandum for Record (Paragraph 1.4.3, p 1-19)	Phase I
Step 2 Identify the Decision		Review Phase I Memorandum for Record (Paragraph 2.1.1, p 2-1)	Phase II
	2.1 "Identify the principal study question." (p 14)	Identify and Document Project Objectives (Paragraph 1.2.2, p 1-10 to 1-12) Document Current Executable Stage (Paragraph 1.3.3, p 1-18)	Phase I
	2.2 "Define the alternate actions that could result from resolution of the principal study question." (p 15)	Define Probable Remedies (Paragraph 1.2.4, p 1-12 to 1-13)	Phase I

Table E-1 (continued)
Crosswalk from 7-Step DQO Process to the TPP Process

EPA's 7-Step DQO Process[a]		Technical Project Planning (TPP) Process[b]	
DQO Step	Activity[c]	Activity	TPP Phase(s)
Step 2 Identify the Decision (continued)	2.3 "Combine the principal study question and the alternative actions into a decision statement." (p 15)	Document Current Executable Stage (Paragraph 1.3.3, p 1-18)	Phase I
	2.4 "Organize multiple decisions." (p 15 and Figure 2-1)	Define Courses of Action for Achieving Site Closeout (Paragraph 1.3.2, p 1-16 to 1-17) Document Current Executable Stage (Paragraph 1.3.3, p 1-18) Establish Data User's Roles (Paragraph 2.1.2, p 2-1 to 2-4)	Phase I Phase II
Step 3 Identify Inputs to the Decision	3.1 "Identify the information that will be required to resolve the decision statement." (p 18)	Establish Data User's Roles (Paragraph 2.1.2, p 2-1 to 2-4)	Phase II
	3.2 "Determine the sources for each item of information identified above." (p 18)	Evaluate Use of Existing Data (Paragraph 2.1.3, p 2-4) Define Data Needs (Paragraph 2.1.4, p 2-4 to 2-9)	Phase II
	3.2.1 "Identify and list the sources for the information needed to resolve the decision statement." (p 18)	Define Data Needs (Paragraph 2.1.4, p 2-4 to 2-9)	Phase II
	3.2.2 "Next, qualitatively evaluate whether any existing data are appropriate for the study." (p 18)	Evaluate Use of Existing Data (Paragraph 2.1.3, p 2-4)	Phase II
	3.3 "Identify the information that is needed to establish the action level." (p 18)	Define Data Needs (Paragraph 2.1.4, p 2-4 to 2-9) Sampling and Analysis Planning Worksheet (Appendix F)	Phase II

Table E-1 (continued)
Crosswalk from 7-Step DQO Process to the TPP Process

EPA's 7-Step DQO Process[a]		Technical Project Planning (TPP) Process[b]	
DQO Step	Activity[c]	Activity	TPP Phase(s)
Step 3 Identify Inputs to the Decision (continued)	3.4 "Confirm that appropriate measurement methods exist to provide the necessary data." (p 18)	Plan Sampling and Analysis Approaches (Paragraph 3.1.2, p 3-2 to 3-7)	Phase III
Step 4 Define the Study Boundaries	4.1 "Specify the characteristics that define the population of interest." (p 20)	Define Data Needs (Paragraph 2.1.4, p 2-4 to 2-9) Document Data Needs (Paragraph 2.2, p 2-9 to 2-10) Data Need Worksheets (Appendix F)	Phase II
	4.2 "Define the spatial boundary of the decision statement." (p 20)	Define Data Needs (Paragraph 2.1.4, p 2-4 to 2-9) Document Data Needs (Paragraph 2.2, p 2-9 to 2-10)	Phase II
	4.2.1 "Define the geographic area to which the decision statement applies." (p 20)	Define Data Needs (Paragraph 2.1.4, p 2-4 to 2-9) Document Data Needs (Paragraph 2.2, p 2-9 to 2-10) Data Need Worksheets (Appendix F)	Phase II
	4.2.2 "When appropriate, divide the population into strata that have relatively homogeneous characteristics." (p 21; Figure 4-1, p 22)	Define Data Needs (Paragraph 2.1.4, p 2-4 to 2-9) Document Data Needs (Paragraph 2.2, p 2-9 to 2-10) Plan Sampling and Analysis Approaches (Paragraph 3.1.2, p 3-2 to 3-7)	Phase II Phase III
	4.3 "Define the temporal boundary of the problem." (p 21)	Define Data Needs (Paragraph 2.1.4, p 2-4 to 2-9)	Phase II
	4.3.1 "Determine the time frame to which the decision applies." (p 21)	Define Data Needs (Paragraph 2.1.4, p 2-4 to 2-9)	Phase II

Table E-1 (continued)
Crosswalk from 7-Step DQO Process to the TPP Process

EPA's 7-Step DQO Process[a]		Technical Project Planning (TPP) Process[b]	
DQO Step	Activity[c]	Activity	TPP Phase(s)
Step 4 Define the Study Boundaries (continued)	4.3.2 "Determine when to collect data." (p 21)	Define Data Needs (Paragraph 2.1.4, p 2-4 to 2-9) Plan Sampling and Analysis Approaches (Paragraph 3.1.2, p 3-2 to 3-7) Develop Data Collection Options (Paragraph 3.2, p 3-8 to 3-9)	Phase II Phase III
	4.4 "Define the scale of decision making." (p 21)	Define Data Needs (Paragraph 2.1.4, p 2-4 to 2-9)	Phase II
	4.5 "Identify any practical constraints on data collection." (p 22)	Recognize Site Constraints and Dependencies (Paragraph 1.3.1, p 1-14 to 1-16) Refine Plans Within Project Constraints (Paragraph 3.1.2.4, p 3-7)	Phase I Phase III
		Complete Phase II Activities (Paragraph 2.3, p 2-10)	Phase II
Step 5 Develop a Decision Rule		Review Phase I and Phase II Information (Paragraph 3.1.1, p 3-1 to 3-2)	Phase III
	5.1 "Specify the statistical parameter that characterizes the population (the parameter of interest)." (p 24 and Table 5-1, pp 25-26)	Define Data Needs (Paragraph 2.1.4, p 2-4 to 2-9)	Phase II
	5.2 "Specify the action level for the study." (p 25)	Define Data Needs (Paragraph 2.1.4, p 2-4 to 2-9) Sampling and Analysis Planning Worksheet (Appendix F)	Phase II

Table E-1 (continued)
Crosswalk from 7-Step DQO Process to the TPP Process

EPA's 7-Step DQO Process[a]		Technical Project Planning (TPP) Process[b]	
DQO Step	Activity[c]	Activity	TPP Phase(s)
Step 5 Develop a Decision Rule (continued)	5.2.1 "Confirm that the action level is greater than the detection and quantitation limits for the potential measurement methods identified in Step 3." (p 25)	Plan Sampling and Analysis Approaches (Paragraph 3.1.2, p 3-2 to 3-7) Develop Data Collection Options (Paragraph 3.2, p 3-8 to 3-9)	Phase III
	5.3 "Develop a decision rule." (p 25)	Define Data Needs (Paragraph 2.1.4, p 2-4 to 2-9)	Phase II
Step 6 Specify Limits on Decision Errors	6.1 "Determine the possible range of the parameter of interest." (p 30, Figures 6-1 and 6-2)	Define Data Needs (Paragraph 2.1.4, p 2-4 to 2-9) Plan Sampling and Analysis Approaches (Paragraph 3.1.2, p 3-2 to 3-7)	Phase II Phase III
	6.2 "Identify the decision errors and choose the null hypothesis." (pp 30-32)	Define Data Needs (Paragraph 2.1.4, p 2-4 to 2-9)	Phase II
	6.3 "Specify a range of possible parameter values where the consequences of decision errors are relatively minor (gray region)." (pp 33-34)	Define Data Needs (Paragraph 2.1.4, p 2-4 to 2-9)	Phase II
	6.4 "Assign probability limits to points above and below the gray region that reflect the tolerable probability for the occurrence of decision errors." (p 34, Figures 6-1 and 6-2, Tables 6-1 and 6-2)	Define Data Needs (Paragraph 2.1.4, p 2-4 to 2-9)	Phase II

Table E-1 (continued)
Crosswalk from 7-Step DQO Process to the TPP Process

EPA's 7-Step DQO Process[a]		Technical Project Planning (TPP) Process[b]	
DQO Step	Activity[c]	Activity	TPP Phase(s)
Step 7 Optimize the Design for Obtaining Data	7.1 "Review the DQO outputs and existing environmental data." (p 38)	Verification of DQO Attainment (Appendix G)	Phase IV Appendix G
	7.2 "Develop general data collection design alternatives." (p 38)	Plan Sampling and Analysis Approaches (Paragraph 3.1.2, p 3-2 to 3-7) Develop Data Collection Options (Paragraph 3.2, p 3-8 to 3-9)	Phase III
	7.3 "Formulate the mathematical expressions needed to solve the design problem for each data collection design alternative." (p 39)	Plan Sampling and Analysis Approaches (Paragraph 3.1.2, p 3-2 to 3-7) Develop Data Collection Options (Paragraph 3.2, p 3-8 to 3-9)	Phase III
	7.4 "Select the optimal sample size that satisfies the DQOs for each data collection design alternative." (p 39)	Plan Sampling and Analysis Approaches (Paragraph 3.1.2, p 3-2 to 3-7)	Phase III
	7.5 "Select the most resource-effective data collection design that satisfies all of the DQOs." (p 39-40 and Figure 7-1)	Plan Sampling and Analysis Approaches (Paragraph 3.1.2, p 3-2 to 3-7) Develop Data Collection Options (Paragraph 3.2, p 3-8 to 3-9) Document Data Collection Options (Paragraph 3.3, p 3-9 to 3-10)	Phase III

Table E-1 (continued)
Crosswalk from 7-Step DQO Process to the TPP Process

EPA's 7-Step DQO Process[a]		Technical Project Planning (TPP) Process[b]	
DQO Step	Activity[c]	Activity	TPP Phase(s)
Step 7 Optimize the Design for Obtaining Data (continued)		Prepare Customer Communications (Paragraph 4.1.1, p 4-1 to 4-2) Encourage Customer Participation (Paragraph 4.1.2, p 4-2 to 4-3) Suggest Regulator Participation (Paragraph 4.1.3, p 4-3) Consider Participation of Others (Paragraph 4.1.4, p 4-3)	Phase IV
	7.6 "Document the operational details and theoretical assumptions of the selected design in the sampling and analysis plan." (p 40)	Prepare Data Quality Objective Statements (Paragraph 4.2.1, p 4-4 to 4-5) Prepare Final Scope of Work or Work Plan (Paragraph 4.2.2, p 4-5) Prepare Fact Sheet(s) (Paragraph 4.2.4, p 4-5 to 4-6)	Phase IV
		Project Objectives Worksheet Site Information Worksheet Data Need Worksheets Sampling and Analysis Planning Worksheet Summary Table of Data Collection Options DQO Worksheet	Appendix F
		DQO Attainment Worksheet	Appendix G

[a] EPA QA/G-4[1]
[b] EM 200-1-2 (31 Aug 98)
[c] The activity number convention has been applied to EPA's 7-Step DQO Process for the convenience of this crosswalk table.